CLAIMS:

1. A steel bar for a steering rack that contains 0.50 to 0.60% by mass of C, 0.05 to 0.5% by mass of Si, 0.2 to 1.5% by mass of Mn, 0.0005 to 0.003% by mass of B, 0.005 to 0.05% by mass of Ti, 0.0005 to 0.1% by mass of Al, and 0.002 to 0.02% by mass of N, wherein:

given D as a diameter of the steel bar, then the steel bar is adjusted in such a manner that quenched and tempered structures in a portion of the steel bar at a depth of D/4 from a surface satisfy conditions I), II), and III) as follows:

I) a sum of a tempered bainitic structure and a tempered martensitic structure accounts for 30 to 100% in area percentage;

II) a regenerated perlite structure accounts for 0 to 50% in area percentage; and

III) a sum of the tempered bainitic structure, the tempered martensitic structure, and the regenerated perlite structure accounts for 50 to 100% in area percentage.

2. A steel bar for a steering rack according to claim 1, wherein:

the steel bar contains 1.5% by mass or less (excluding 0% by mass) of Cr.

3. A steel bar for a steering rack according to claim 1,

wherein:

the steel bar further contains at least one kind from 0.06% by mass or less (excluding 0% by mass) of S, 0.3% by mass or less (excluding 0% by mass) of Pb, 0.2% by mass or less (excluding 0% by mass) of Bi, 0.1% by mass or less (excluding 0% by mass) of Te, 0.01% by mass or less (excluding 0% by mass) of Mg, 0.01% by mass or less (excluding 0% by mass) of Ca, 0.01% by mass or less (excluding 0% by mass) of rare-earth elements, 0.3% by mass or less (excluding 0% by mass) of Zr.

4. A method of manufacturing a steel bar for a steering rack, comprising:

rolling a steel piece containing 0.50 to 0.60% by mass of C, 0.05 to 0.5% by mass of Si, 0.2 to 1.5% by mass of Mn, 0.0005 to 0.003% by mass of B, 0.005 to 0.05% by mass of Ti, 0.0005 to 0.1% by mass of Al, and 0.002 to 0.02% by mass of N;

quenching a steel bar obtained as result of the rolling at a temperature of 780°C or higher, so that a sum of a bainitic structure and a martensitic structure in a portion of the steel bar at a depth of D/4 (D is a diameter of the steel bar) from a surface accounts for 30% to 100% in area percentage; and

tempering the steel bar for a time as short as or shorter than 20 min by placing the steel bar in an oven heated to ambient temperature of 660 to 720°C followed by cooling to room

temperature, so that a regenerated perlite structure in the portion of the steel bar at the depth of D/4 from the surface accounts for 0 to 50% in area percentage and a sum of the tempered bainitic structure, the tempered martensitic structure, and the regenerated perlite structure in the portion of the steel bar at the depth of D/4 from the surface accounts for 50 to 100% in area percentage.

5. A method of manufacturing a steel bar for a steering rack according to claim 4, wherein:

the steel piece contains 1.5% by mass or less (excluding 0% by mass) of Cr.

6. A method of manufacturing a steel bar for a steering rack according to claim 4, wherein:

the steel piece further contains at least one kind from 0.06% by mass or less (excluding 0% by mass) of S, 0.3% by mass or less (excluding 0% by mass) of Pb, 0.2% by mass or less (excluding 0% by mass) of Bi, 0.1% by mass or less (excluding 0% by mass) of Te, 0.01% by mass or less (excluding 0% by mass) of Mg, 0.01% by mass or less (excluding 0% by mass) of Ca, 0.01% by mass or less (excluding 0% by mass) of rare-earth elements, 0.3% by mass or less (excluding 0% by mass) of Zr.

7. A steering rack formed using a steel bar for a steering

rack according to claim 1, 2, or 3.

8. A steering rack according to claim 7, wherein:

the steering rack includes a main body and a rack teeth forming portion including plural rack teeth and provided to part of a peripheral surface of the main body;

a hardening layer having undergone induction quenching and tempering is provided at least to the rack teeth forming portion; and

the rack teeth forming portion has a surface hardness of 680 to 800 HV in Vickers hardness.

9. A steering rack according to claim 8, wherein:

the main body includes a portion that opposes the rack teeth forming portion in a radius direction, and a portion present at a depth of (3/4)D (D is a diameter of the steel bar) from a surface of the portion that opposes the rack teeth forming portion in the radius direction; and

the steering rack is adjusted in such a manner that quenched and tempered structures in the portion at the depth of (3/4)D satisfy conditions I), II), and III) as follows:

I) a sum of a tempered bainitic structure and a tempered martensitic structure accounts for 30 to 100% in area percentage;

II) a regenerated perlite structure accounts for 0 to 50%

in area percentage; and

III) a sum of the tempered bainitic structure, the tempered martensitic structure, and the regenerated perlite structure accounts for 50 to 100% in area percentage.

10. A steering rack according to claim 8, wherein:

the rack teeth forming portion includes a teeth bottom portion; and

an effective case hardened depth in the teeth bottom portion is 0.1 to 1.5 mm from a surface of the teeth bottom portion.

11. A steering rack according to claim 8, wherein:

the rack teeth forming portion includes a teeth bottom portion; and

an effective case hardened depth in the teeth bottom portion is 0.3 to 1.2 mm from a surface of the teeth bottom portion.

12. A steering rack according to claim 8, wherein:

the rack teeth forming portion includes a teeth bottom portion; and

no residual ferrite is contained in the teeth bottom portion in a 0.1 mm deep region from a surface thereof.